Appendix J - SWRP Closure Plan

RCRA INTERIM STATUS CLOSURE PLAN

STORM WATER RETENTION POND

KERR-McGEE REFINING CORPORATION

WYNNEWOOD, OKLAHOMA

Prepared by:

Roberts/Schornick and Associates, Inc.
Environmental Consultants
3700 W. Robinson, Suite 200
Norman, Oklahoma
405/321-3895

November 30, 1992
(revised July 28, 1993)

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KERR-McGEE REFINING CORPORATION
WYNNEWOOD, OKLAHOMA

1.0 INTRODUCTION

1.1 Purpose

The purpose of this document is to present an interim status closure plan for a hazardous waste surface impoundment at the Kerr-McGee Refining Corporation (KMRC) Refinery in Wynnewood, Oklahoma. The surface impoundment will be closed in-place as a landfill in accordance with the requirements of 40 CFR 265.228 and 265.310. This plan is developed in accordance with 40 CFR 265.112 and describes the steps necessary to perform closure of the surface impoundment.

Kerr-McGee considered the closure options available: removal and closure in place. Both closure options are described in 40 CFR 265.228(a). Paragraph 1 describes requirements for closure by removal, commonly referred to as clean closure. Paragraph 2 describes closure in place.

Clean closure is considered to be impractical in this case due to the design of the impoundment, the proximity of the impoundment bottom to the seasonally high groundwater elevation, and the probable requirement to achieve very low soil concentrations in order to accomplish clean closure. The impoundment

does not have an engineered liner. The impoundment bottom is at or very near the seasonally high groundwater elevation. David Vogler of the EPA has confirmed that any clean closure criteria that could be approved by the EPA would have to be very low concentrations of contaminants in soil.

Given the design and location of the impoundment, it is very unlikely that any reasonable clean closure criteria could be achieved in the field. Clean closure would almost surely require excavation of saturated soils. Such excavation would be very difficult and expensive, and would have a low likelihood of success. Therefore, Kerr-McGee has chosen to pursue closure in place in accordance with 40 CFR 265.228(a)(2).

1.2 Surface Impoundment Description

The interim status hazardous waste surface impoundment addressed by this closure plan is a storm water retention pond (SWRP) located at the KMRC Wynnewood Refinery. The Wynnewood Refinery is engaged in petroleum refining and produces unleaded gasoline, diesel, propane, fuel oil, asphalts,

distillates, and solvents. The SWRP is a 0.52 acre surface impoundment which previously received storm water from the refinery, as well as occasional dry weather flow. During heavy rain events process water commingled with storm water carrying primary sludge from petroleum refining process sewer system into the SWRP. The SWRP became newly regulated as a hazardous waste management unit on May 2, 1991, when primary sludge from petroleum refining became a newly listed hazardous waste (waste code F037). KMRC has ceased all discharges into the SWRP as of December 31, 1992, and closure is anticipated sometime in the fall of late 1993.

2.0 WASTE CHARACTERIZATION

2.1 Impoundment Sludge Sampling

The SWRP is regulated under RCRA due to the presence of F037 sludge as defined by the regulations. TCLP analyses of the sludge is presented in Appendix A. The results of the TCLP analyses indicate that the sludge would not be considered characteristically hazardous if it were not an F037 sludge. Since clean closure is not proposed, this information is significant in the evaluation of a suitable closure plan. The F037 sludge is the only RCRA hazardous waste to be managed in the unit.

Appendix B contains representative analytical sheets for water and sludge samples which have been previously presented in the Multimedia Report. Also included in Appendix B are the CLP Qualifier Flags utilized by the laboratory in the reporting of the analysis. One laboratory duplicate QA/QC analysis is included for sludge sample ID 990006.

Appendix C contains the analytical sheets of two composite samples of sludge which were taken from the SWRP and previously submitted in the RFI Report. The samples were analyzed for the following: Skinner List Metals, Skinner List Volatiles, Skinner List Semivolatiles, EP Toxicity Metals, and ignitability.

2.2 Waste Volume Estimates

The exact depth of sludge remaining in the SWRP is unknown. Sludge has been periodically dredged from the SWRP for many years. For purposes of closure, it is anticipated that the sludge from the SWRP exists down to an elevation of 837 feet (reference KMRC plant datum). Although no construction drawings of the SWRP are available, it is unlikely that the bottom of the SWRP was constructed below this elevation due to the presence of groundwater. It is estimated that the sludge varies, in thickness, but is a maximum of approximately two feet in thickness. Therefore, a maximum volume of sludge remaining in the SWRP is approximately 1000 cubic yards.

3.0 HYDROGEOLOGY

The hydrogeology and geology at the Refinery have been thoroughly characterized in numerous investigations. A report addressing the hydrogeology and geology of the Refinery in the immediate vicinity of the SWRP is found in the RCRA Interim Status Post-Closure Plan for the SWRP.

Included in the post-closure plan are various cross-sections, potentiometric maps, hydrographs of relevant monitoring wells, drawings of monitoring well networks, and descriptions of the site hydrogeology and geology.

The most important groundwater issue related to this closure plan relates to the potentiometric surface in the vicinity of the SWRP. As can be seen in numerous exhibits in the Post-Closure Plan, the existing bottom of the SWRP is below the groundwater table during a considerable portion of the year.

4.0 CLOSURE

4.1 Introduction

The SWRP impoundment will be closed on-site according to 40 CFR 265 standards. No waste from the impoundments will be disposed off-site. The closure operations will include the following:

- Impoundment Free Liquid Management (Section 4.3)
- Preliminary Site Preparation (Section 4.4)
- Raising of the SWRP Bottom (Section 4.5)
- Placement of Compacted Layer of Backfill (Section 4.6)
- Impoundment Sludge Stabilization (Section 4.7)
- Disposal of Sludge in Impoundment (Section 4.8)
- Placement of Compacted Backfill (Section 4.9)
- Cap Construction (Section 4.10)
- Placement of Final Cover (Section 4.11)
- Run-on and Run-off Management (Section 4.12)
- Construction and Earthwork Equipment (Section 4.13)
- Decontamination of Equipment (Section 4.14)
- Access Control (Section 4.15)

A description of each of the above operations is described within this section.

4.2 Summary of Closure Plan

The SWRP will be closed on-site as a landfill. The total area occupied by the SWRP is 0.52 surface acres. Liquids present in the SWRP prior to closure and liquids accumulated in the SWRP during closure activities will be managed by utilizing the Refinery wastewater treatment plant and discharged through existing NPDES Outfall 001. Preliminary site shaping and grading and removal of certain structures will prepare the site to begin closure activities. Structures which have not been in contact with SWRP sludge will be removed from the area for reuse, scrap, or final disposal. Structures which have been in contact with SWRP sludge will be crushed and disposed of within the closed cell.

All visible sludge in the SWRP will be excavated. It is anticipated that the bottom of the SWRP will be above the groundwater table during the scheduled closure activities. The excavated sludge will be stockpiled in one end of the SWRP. In order to raise the sludge above seasonal rises in groundwater elevations, the excavation will be backfilled with gravel to an elevation of 842.5 feet. A geotextile will be placed on top of the gravel. A one (1) foot layer of compacted fill material will be placed on top of the geotextile in lifts not to exceed eight (8) inches of uncompacted material.

All impoundment sludges and excavated material will be stabilized and compacted on top of the compacted backfill in lifts not to exceed eight (8)

inches of uncompacted sludge. Compacted backfill will be used, in lifts not to exceed eight (8) inches of uncompacted material, to adequately shape the subgrade to design grades to accept the cap. A two (2) foot clay cap will be placed, in lifts not to exceed eight (8) inches of uncompacted material, and compacted over the compacted backfill. An HDPE drainage skirt will be constructed around the pump station. A geotextile will be placed on top of the clay cap. A synthetic drainage layer will be sandwiched between the lower geotextile and an upper geotextile. A minimum of six (6) inches of protective rock cover will be placed on top of the geotextile. Final grading for site drainage, placement of protective gravel cover over disturbed areas, and the placement of signs indicating the presence of the closure cell will complete construction activities.

4.3 Impoundment Free Liquid Management

It is important that closure activities take place during a dry period of the year, preferably in July, August, and September, in order to facilitate sludge stabilization and liquid management. It is also important that groundwater levels be as low as possible to reduce construction difficulties related to excavation of the bottom of the SWRP. Groundwater monitoring records indicate that the groundwater will be at its lowest level for an extended period of time during these months (see hydrographs in the SWRP post-closure plan).

Water present in the SWRP at the beginning of closure activities will be managed by pumping the water to the existing wastewater treatment system with temporary dewatering equipment. The wastewater will then be treated and discharged through existing NPDES Outfall 001. Any accumulation of water in the SWRP during closure activities (i.e. storm water or groundwater) will be managed in a like manner.

4.4 Preliminary Site Preparation

The existing conditions of the SWRP are shown in Drawing 1. Preliminary site preparation will consist of items such as: mobilization, removal of structures as noted on Drawing 2, and preparing the existing surface for closure activities by regrading and compaction as required. Some structures, which have not contacted sludge, will be removed from the SWRP and scrapped. These items include: pipe railing, footings, light poles, piping and electric wiring. All structures removed from the SWRP, which are not suitable for reuse, will be disposed of at an approved Industrial Waste landfill. Structures which have been in contact with sludge, which will not interfere with the integrity of the new construction, will be placed within the SWRP for final disposal. These items include crushed corrugated metal pipe and the associated concrete structures. Also, any special arrangements with the Refinery, or modifications necessary to accommodate the construction activities, will take place during this activity.

4.5 Raising Bottom of the SWRP

In order to raise the sludge above the seasonal fluctuations in the groundwater, it is necessary to remove the sludge from the SWRP bottom and place rock in the bottom of the SWRP. This will be accomplished by excavating only a portion of the SWRP bottom at a time. All visible sludge in the SWRP will be excavated. It is anticipated that the bottom of the SWRP will be above the groundwater table during the scheduled closure activities. Excavated material will be temporarily stored in unexcavated portions of the SWRP until sludge stabilization can take place.

When a sufficient area has been excavated, the excavation will be backfilled to an elevation of 842.5 feet with 3.5 inch crushed limestone rock. The limestone rock is available from local limestone quarries. Limestone rock was chosen as the material for backfill due to the potential presence of groundwater which could make the compaction of other types of materials difficult. This procedure will be repeated until the entire bottom of the SWRP is excavated and backfilled with rock to an elevation of 842.5 feet.

4.6 Placement of Compacted Layer of Backfill

As mentioned in Section 4.5, the raising of the SWRP bottom will be accomplished by raising separate portions of the SWRP bottom at a time. When a raised area is large enough for equipment maneuverability, placement

of a one (1) foot layer of compacted backfill will begin on the raised portion. This will provide an adequate base for subsequent sludge stabilization and disposal.

A geotextile will be used for separation of gravel and the one (1) foot layer of backfill to prevent intrusion of soil and potential subsidence of overlaying layers. A needlepunched, nonwoven, polypropylene geotextile such as Supac 8NP by Phillips 66, or equivalent, will be used with two (2) feet overlap. The rock will be leveled prior to installation of the geotextile. The geotextile will be inspected prior to installation to verify that it conforms to specifications and that no damage occurred during shipment. After placement, all overlaps will be visually confirmed and the entire surface will be visually inspected for damage. Any damaged areas will be replaced with a two (2) foot overlap.

A one (1) foot thick layer of compacted backfill will be placed directly on top of the geotextile. The backfill shall be composed of silty clays or sandy clays of medium plasticity from a clean off-site source. Soils should be classified as type CL under the Unified Soil Classifications System (ASTM D2487) with the additional characteristic of having a liquid limit in the range of 25 to 55 and a minimum plasticity index of 16.

The backfill materials shall be placed in lifts not to exceed eight (8) inches of uncompacted material and shall be compacted to at least 90% of the Standard Proctor maximum dry density (ASTM D698). Density testing will be necessary during earthmoving operations to determine the degree of attained compaction. After placement and before compaction, all soil particles greater than six (6) inches in diameter shall be raked or removed from the lift. No frozen material shall be placed in this fill, and no fill may be placed on frozen surfaces. Frozen material on the working surface shall be removed and reworked or disposed of prior to fill placement.

Field testing to determine the adequacy of compaction shall include density testing determination of compacted fill and shall be performed in accordance with any of the following test methods:

- ASTM D2922 - "Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)"

- ASTM D2167 - "Density of Soil and Soil-In-Place by the Rubber Balloon Method"

- ASTM D1556 - "Density of Soil In-Place by the Sand Cone Method"

Results of the in-place density tests shall be compared to the previously-performed moisture-density relationship (Proctor) to determine if the compactive effort applied in the field was adequate to attain at least 90% of the Standard Proctor maximum dry density (ASTM D698). In-place fill not meeting this requirement shall be recompacted or removed and replaced. A minimum of one (1) field density tests per 5,000 square feet per lift shall be performed.

4.7 Impoundment Sludge Stabilization

When a sufficiently large area has been raised and a one (1) foot layer of compacted backfill has been placed, an adequate base for subsequent sludge stabilization and disposal will have been prepared.

All sludge and excavated materials will be stabilized and disposed in the SWRP. The maximum sludge volume is estimated to be 1000 cubic yards. The stabilization process objective is to ensure sufficient structural integrity of the stabilized sludges in the impoundment to support the final backfill and cover. The stabilized sludges must also have sufficient structural strength to support the equipment loading which will occur during backfill and cover construction. With the addition of the stabilization agents, the sludge disposal volume is estimated to increase to approximately 1200 cubic yards.

The approach to be taken in stabilizing the sludges is consistent with current state-of-the-art methods being utilized to achieve this objective at other such facilities. A contractor experienced in sludge stabilization will be utilized. Some variation may occur among contractors in the stabilization procedure; however, the stabilization process is anticipated to proceed as follows:

1. A contract will be negotiated with a stabilization contractor.

2. A representative sample of the impoundment sludge will be obtained for testing. The objectives of the testing will be as follows:

   a) Establish the optimum stabilization reagent. Options for stabilization reagents are expected to be cement kiln dust, class 'C' fly ash, Portland cement, lime, clean soil, or a combination of these. It is presently anticipated that clean soil with Portland cement may be the selected stabilization reagents. These materials, at the correct proportions, should provide satisfactory structural integrity for stabilization of sludges in the SWRP.

   b) Establish the optimum mixing ratio of the selected stabilization reagents.

c) Obtain sufficient unconfined compressive strength of the stabilized sludge to ensure structural integrity for supporting the construction and cover loads. Pocket penetrometer or cone penetrometer readings will be used in the field to verify that the sludge has been stabilized adequately.

The construction equipment loads will generate greater stresses (i.e. pressures) on the stabilized sludges than the final cover. The maximum possible unit pressure on the upper layer of stabilized sludge from the completed cover and backfill is approximately 0.3 tons per square foot (maximum thickness of five (5) feet, soil unit weight of approximately 125 PCF). Conservatively, then, an unconfined compressive strength criteria of 1.0 tons per square foot is adequate for the stabilized sludge. The ability to achieve this strength will be demonstrated in the field by pocket or cone penetrometer. Compressive strength will also be evident in the field by the ability of the stabilized material to support heavy construction equipment.

3. Field stabilization operations will begin once all testing is complete. The field operations are anticipated to include the following:

   a) Delivery of the stabilization reagents to the site.

   b) Mobilization of stabilization equipment to the site.

   c) The stabilization reagents will be loaded and transported by a pneumatic truck or standard end dump truck to the SWRP where stabilization is to occur.

   d) The stabilization reagents spread over the sludges at the ratio established.

   e) The reagents then will be mixed with the impoundment sludges.

   f) After curing, the unconfined compressive strength will be verified with a pocket penetrometer.

4.8 Disposal of Sludge in Impoundment

The stabilized sludge will be placed on top of the one foot layer of compacted backfill in a maximum of eight (8) inch lifts of uncompacted material. An unconfined compressive strength criteria of 1.0 tons per square foot should be obtained for the sludge in place.

4.9 Placement of Compacted Backfill

After placement and compaction of the stabilized sludge, backfill will be placed and compacted in a maximum of eight (8) inch uncompacted lifts until final subgrade dimensions have been obtained. Oily, non-hazardous, on-site soils from the product loading facility tank dike area (primarily around Tank #1470) and the shallow, oil-stained soil removed from the stormwater drainage ditch, which used to transport water to the SWRP, may be used for portions of the backfill when determined to meet unconfined compressive strength criteria of 1.0 ton per square foot. If determined to be necessary to obtain unconfined compressive strength criteria, stabilization of the oily, on-site soils will occur in the same manner as described in Section 4.7. Any oily, on-site soils used for backfill material will be placed above the seasonal groundwater table and underneath the confines of the low permeability cap. The same procedures for placement and compaction as were described in Section 4.6 will be followed.

All contaminated structures to be disposed of in the closed cell will be placed in a manner to not penetrate into the clay cap. Corrugated metal pipe will be crushed prior to being placed in the SWRP. Concrete footings will be broken and associated rebar will be cut into sizes and shapes such that no objects will protrude into other closure layers. The objects will be placed in a manner to not interfere with soil compaction efforts. No objects will be placed into the

cell which, over time, will lose their strength and ability to support cover material.

4.10 Cap Construction

The material for the clay cap is required to have a compacted permeability coefficient of less than or equal to 1×10^{-7} cm/sec. The source of a suitable clay will be determined during selection of contractors.

At a minimum, two moisture-density relationships and permeability tests of representative clay borrow samples for cap construction shall be established prior to fill compaction. Testing shall be performed in accordance with ASTM D698 and ASTM STP479. These laboratory tests shall form the basis for the acceptability of the clay material. Additional tests to verify moisture-density relationships and permeability may be performed if the borrow material exhibits different characteristics than the tested soil. Field samples of compacted clay cap material will be obtained for laboratory analysis to verify the in-place coefficient of permeability.

The edges of the cap will be keyed into the existing surface as shown on Drawing 3. The two (2) foot clay cap will consist of a minimum of four (4) lifts, each lift not to exceed eight (8) inches of uncompacted material. All lifts will be compacted to 95% Standard Proctor maximum density. A minimum of

one (1) field density test per 5,000 square feet per lift shall be performed. As shown on Drawing 2 and Drawing 3, the top of the clay cap will be graded to a slope of approximately 5%.

4.11 Placement of Final Cover

After the clay cap has been graded to final dimensions, a needlepunched, nonwoven, polypropylene geotextile will be placed on top of the cap for separation of layers. Supac 8NP by Phillips 66, or equivalent, geotextile will be used with two (2) feet overlap.

A 40 mil high density polyethylene (HDPE) skirt will be bolted, with stainless steel expansion bolts, to the pump station to provide a water tight connection with the clay cap. The skirt will minimize the migration of liquids between the clay cap and the pump station. All seams in the HDPE will be extrusion welded. The geotextile will be lapped over the corners of the pump station to provide a cushion for the HDPE. The skirt will extend two (2) feet over the clay cap. A neoprene strip will be placed at the edge of the HDPE between the skirt and the concrete to prevent water from running under the skirt. A stainless steel batten strip will be bolted every six (6) inches to hold the HDPE tightly to the pump station. Details are provided on Drawing 3.

A synthetic drainage layer will be placed over the entire clay cap. Gundnet XL-14 by Gundle, or equivalent, will be placed directly on top of the geotextile and HDPE skirt. Gundnet XL-14 has a minimum thickness of 5.0 to 6.5 millimeters with a minimum hydraulic transmissivity of 2×10^{-3} m^2/sec under a 10,000 psf compressive load between two layers of Gundline HD at a 0.25 gradient. Although the test condition is not identical to this design, Gundnet was designed to provide hydraulic conductivity sufficient to replace approximately 12 inches of sand drainage layer. The actual transmissivity of the drainage media will exceed the recommendation of 3×10^{-5} m^2/sec made in the Technical Guidance Document, "Final Covers on Hazardous Waste Landfills and Surface Impoundments", EPA 530-SW-89-047, July 1989. Details are provided on Drawing 3.

The synthetic drainage layer will be unrolled and placed edge-to-edge with no gaps or overlaps. No seams are required. Temporary sandbags may be required to hold the drainage layer in position until being covered with a geotextile. The drainage layer will extend to all edges of the clay cap to completely drain the cap. Gundfab by Gundle, or equivalent, will overlay the synthetic drainage layer with a two (2) foot overlap.

Approximately six (6) inches of 1.5 inch crushed limestone rock will be placed as the final cover material to prevent damage to the cap. The 1.5 inch crushed

limestone rock will be a crusher run type from local limestone quarries. The rock cap is hard and durable and is sufficiently sloped at approximately 5% to adequately drain stormwater runoff from the cap. The protective rock layer combined with the geotextile provide excellent protection against erosion of the clay cap.

4.12 Run-on and Run-off Management

Final site contours will be graded as shown on Drawing 2. Storm water runoff from the closed surface impoundment will be routed to drain to a point above NPDES Outfall 002. Drainage from the cap and the immediate site, as shown on Drawing 2, is designed for a 25-year, 24-hour storm event. This analysis assumes that downstream drainage is sufficient to prevent backup. Any soils disturbed during this final regrading process will be covered as necessary with gravel similar to existing on-site material.

The final cover slopes on the cap (see Drawing 2 and Drawing 3) are designed to be approximately 5%. The 5% slope will allow for adequate drainage from the cap. This drainage plan will prevent pooling adjacent to the impoundment and prevent run-on to the closed surface impoundment cover.

4.13 Decontamination of Equipment

In accordance with 40 CFR 265.114, after completion of excavation and disposal operations, all contaminated equipment will be decontaminated by steam cleaning in an area designated for this activity. A temporary decontamination pad will be established. The free liquids will be collected and treated utilizing the existing wastewater treatment facility and discharged through NPDES Outfall 001. Any solids generated during equipment decontamination will be stabilized and placed in the closure cell prior to final backfill operations. Any solids produced during equipment cleaning after final backfill operations begin will not require any special disposal since there will be no contact with sludge in final operations.

Equipment contacting sludge will be steam cleaned to the point where all visible contamination is removed. Once this occurs, the equipment will be determined to be decontaminated and allowed to be removed from the active work area.

4.14 Access Control

Access within the Facility is limited by a security fence surrounding the entire refinery to prevent unknowing and/or unauthorized entry of all persons. The immediate perimeter of the cap will be marked with signs to prevent unauthorized activity which would damage the cap.

5.0 CLOSURE SCHEDULE

In accordance with 40 CFR 265.113, all impoundment sludges will be stabilized within 90 days of initiating closure. Also, all closure activities will be completed within 180 days as required by the regulations. A relative schedule for closure is presented in Table 1. The optimum time to begin closure operations at the site is in the late summer months, preferably during July, August and September. During this period of the year, the rainfall events occur with less frequency, duration, and intensity and the groundwater elevations are at a minimum. Pending approval of this closure plan, it is anticipated that closure activities will occur in the summer, or fall, of 1993.

6.0 CLOSURE CERTIFICATION

Upon completion of closure activities, KMRC will submit to the OSDH and EPA certification that the SWRP has been closed in accordance with the specifications in the approved closure plan. The certification will be signed by the appropriate KMRC official and an independent registered professional engineer as required by 40 CFR 265.115.

Supervision and construction management will occur primarily on-site. Construction management will consist of numerous procedures to ensure quality construction and documentation sufficient to ensure that closure occurred in accordance with the approved closure plan. The following is a list of some of the procedures to be used for QA/QC:

- Preconstruction meetings will be conducted with contractors to go over the closure plan requirements.

- Verification that source materials will comply with specifications will occur prior to construction. All materials will have appropriate testing performed and results documented prior to acceptance as a suitable material.

- Materials will be inspected upon arrival on-site to visually confirm and document conformance with specifications. In the case of materials like geotextiles, the material will be examined for damage. When loads of material arrive which visually appear different than the material originally tested, the material will be rejected or retested as appropriate.

- Construction will be observed to verify that construction techniques are suitable to maintain the criteria established in the approved closure plan.

- Elevations, specified layer thicknesses, and final drainage contours will be confirmed by independent surveys.

- Specified physical testing required in the closure plan will be performed and documented independently.

- General construction activities will be observed independently to assure that damage is not occurring to previous work.

- As-built construction drawings will be generated from survey information to confirm intermediate and final contours.

Documentation obtained from the above procedures will be used to determine and certify that the closure occurred in accordance with the approved closure plan.

7.0 SURVEY PLAT

In accordance with 40 CFR 265.116, upon completion of closure activities, KMRC will submit to the local zoning authority, (or the authority with jurisdiction over local land use), to the OSDH, and to the EPA Regional Administrator, a survey plat indicating the location and dimensions of the closed impoundment with respect to permanently surveyed benchmarks. This plat will be prepared and certified by a registered professional land surveyor. The plat filed with the local zoning authority, or the authority with jurisdiction over local land use will contain a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the hazardous waste disposal unit in accordance with the applicable 40 CFR Subpart G regulations.

TABLES

TABLE 1

CLOSURE SCHEDULE

Table 1
Closure Schedule
Storm Water Retention Pond
Kerr-McGee Refining Corporation

TIME LINE															
		WEEKS													
	# of Days	01	02	03	04	05	06	07	08	09	10	11	12	13
Mobilization	2	---												
Impoundment Free Liquid Management	3	---												
Preliminary Site Preparation	3		---											
Raising Bottom of SRP	15		---	-----	-----	---								
Impoundment Sludge Stabilization	5					---	-----							
Placement of Compacted Layer of Backfill	2						---	---						
On-site Sludge Disposal	3							---						
Placement of Compacted Backfill	3								-----	-----	-----			
Cap Construction	10											---		
Placement of Final Cover	2											---		
Run-on and Run-off Management	3												---	
Access Control	2												---	
Decontamination/Demobilization	2													---
Certification	5													---
Survey/File With Plat	3													
TOTAL WORK DAYS	63													
	12.4 weeks													

APPENDICES

APPENDIX A

TCLP ANALYTICAL RESULTS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. ALBANY SUITE C BROKEN ARROW, OK 74012 918 251-2858

Client Name: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OK 73125

Client ID: STORMWATER RETURN PD **Project ID:** WYNNEWOOD SPECIAL

SWLO ID: 9900.12 **Report:** 9900.12 -P

Collected: 06/09/1992 **Report Date:** 06-30-1992 **Page:** 1
Received: 06/10/1992 **Last Modified:** 06/30/1992 **Matrix:** Sludge

TEST	DATE EXTRACTED	DETECTION LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
		*** HAZARDOUS WASTE ***				
TCLP EXTRACTION					06/11/92	SW 1311
TCLP ZERO HDSPC					06/11/92	SW 1311
		*** METALS ***				
METALS -ICP						SW6010
ARSENIC		.05	mg/l	ND	06/15/92	
BARIUM		.02	mg/l	1.64	06/15/92	
CADMIUM		.005	mg/l	ND	06/15/92	
CHROMIUM		.005	mg/l	ND	06/15/92	
LEAD		.05	mg/l	.104	06/15/92	
SILVER		.01	mg/l	ND	06/15/92	
SELENIUM		.05	mg/l	ND	06/15/92	
HG TOXICITY		0.002	mg/L	ND	06/16/92	SW 7470

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
I = UNABLE TO QUANTITATE DUE TO MATRIX INTERFERENCE
"^ = NOT APPLICABLE
hodology: SM = STANDARD METHODS, 16th EDITION, 1985
EPA = #EPA600/4-79-020, MARCH 1985

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
D = SURROGATES DILUTED OUT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

SW = EPA METHODOLOGY, "#SW846", THIRD EDITION, NOVEMBER 1986

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. ALBANY SUITE C BROKEN ARROW, OK 74012 918 251-2858

Client Name: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OK 73125

Client ID: STORM WATER N
Project ID: WYNNEWOOD SPECIAL

SWLO ID: 9913.02
Report: 9913.02

Collected: 06/10/1992
Report Date: 06-30-1992
Page: 1

Received: 06/11/1992
Last Modified:
Matrix: Sludge

TEST	DATE EXTRACTED	DETECTION LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
		*** HAZARDOUS WASTE ***				
TCLP EXTRACTION					06/12/92	SW 1311
TCLP ZERO HDSPC					06/15/92	SW 1311
		*** METALS ***				
METALS -ICP						SW6010
ARSENIC		.05	mg/l	ND	06/16/92	
BARIUM		.02	mg/l	1.20	06/16/92	
CADMIUM		.005	mg/l	ND	06/16/92	
CHROMIUM		.005	mg/l	.045	06/16/92	
LEAD		.05	mg/l	ND	06/16/92	
SILVER		.01	mg/l	ND	06/16/92	
SELENIUM		.05	mg/l	ND	06/16/92	
HG TOXICITY		0.002	mg/L	ND	06/16/92	SW 7470

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
I = UNABLE TO QUANTITATE DUE TO MATRIX INTERFERENCE
NA = NOT APPLICABLE
Methodology: SM = STANDARD METHODS, 16th EDITION, 1985
EPA = #EPA600/4-79-020, MARCH 1985

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
D = SURROGATES DILUTED OUT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

SW = EPA METHODOLOGY, "#SW846", THIRD EDITION, NOVEMBER 1986

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. ALBANY SUITE C BROKEN ARROW, OK 74012 918 251-2858

Client Name: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OK 73125

Client ID: STORM WATER S Project ID: WYNNEWOOD SPECIAL

SWLO ID: 9913.01 Report: 9913.01

Collected: 06/10/1992 Report Date: 06-30-1992 Page: 1
Received: 06/11/1992 Last Modified: Matrix: Sludge

TEST	DATE EXTRACTED	DETECTION LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
*** HAZARDOUS WASTE ***						
TCLP EXTRACTION					06/12/92	SW 1311
TCLP ZERO HDSPC					06/15/92	SW 1311
*** METALS ***						
METALS -ICP						SW6010
ARSENIC		.05	mg/l	.07	06/16/92	
BARIUM		.02	mg/l	.87	06/16/92	
CADMIUM		.005	mg/l	ND	06/16/92	
CHROMIUM		.005	mg/l	.315	06/16/92	
LEAD		.05	mg/l	ND	06/16/92	
SILVER		.01	mg/l	ND	06/16/92	
SELENIUM		.05	mg/l	.11	06/16/92	
HG TOXICITY		0.002	mg/L	ND	06/16/92	SW 7470

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
! = UNABLE TO QUANTITATE DUE TO MATRIX INTERFERENCE
= NOT APPLICABLE
chodology: SM = STANDARD METHODS, 16th EDITION, 1985
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* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
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SW = EPA METHODOLOGY, "#SW846", THIRD EDITION, NOVEMBER 1986

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

CLIENT: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: TOM REED

REPORT: 9900.12VT

DATE: 06-30-92

SAMPLE MATRIX: SLUDGE, TCLP EXTRACTION
SWLO # 9900.12
DATE SAMPLED: 06-09-92
DATE SUBMITTED: 06-10-92
TCLP EXTRACT DATE: 06-11-92
DATE ANALYZED: 06-15-92
METHOD REFERENCE: SW846-8240, EPA METHODOLOGY
DILUTION FACTOR: 5
PROJECT: 80-37-03 GEN; WYNNEWOOD, OK SPECIAL
SAMPLE ID: STORMWATER RETURN PD

RESULTS REPORTED IN mg/l OR Parts Per Million (PPM)

VOLATILES	QUANT. LIMIT	RESULTS	REGULATORY (1) LEVEL (mg/L)
BENZENE	0.025	0.011 J	0.5
CARBON TETRA CHLORIDE	0.025	ND	0.5
CHLOROBENZENE	0.025	ND	100.0
CHLOROFORM	0.025	ND	6.0
1,2-DICHLOROETHANE	0.025	ND	0.5
1,1-DICHLOROETHYLENE	0.025	ND	0.7
TETRACHLOROETHYLENE	0.025	ND	0.7
TRICHLOROETHYLENE	0.025	ND	0.5
VINYL CHLORIDE	0.050	ND	0.2
METHYL ETHYL KETONE	0.050	ND	200.0

QA/QC SURROGATE RECOVERIES

TOLUENE-d8(88-110) 93% BROMOFLUOROBENZENE(86-115) 95% 1,2-DICHLOROETHANE-d4(76-114) 109%

(1) = FEDERAL REGISTER 40 CFR PART 261 THURSDAY, MARCH 29, 1990
TABLE IV-3. PAGE 11845 AND 11846
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

CLIENT: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: TOM REED

REPORT: 9900.12BT

DATE: 07-07-92

SAMPLE MATRIX: SLUDGE, TCLP EXTRACTION
SWLO # 9900.12
DATE SAMPLED: 06-09-92
DATE SUBMITTED: 06-10-92
TCLP EXTRACT DATE: 06-11-92
DATE EXTRACTED: 06-12-92
DATE ANALYZED: 06-22-92
DILUTION FACTOR: 2
PROJECT: 80-37-03 GEN; WYNNEWOOD, OK SPECIAL
SAMPLE ID: STORMWATER RETURN PD

PARAMETER	QUANT. LIMIT	UNIT	RESULTS	METHOD REFERENCE	REGULATORY (1) LEVEL (mg/L)
TCLP SEMI-VOLATILES					
O-CRESOL	0.020	mg/l	0.001 J	SW 8270	200.0
M-CRESOL (2)	0.020	mg/l	ND	SW 8270	200.0
P-CRESOL (2)	0.020	mg/l	0.022	SW 8270	200.0
TOTAL CRESOL'S**	0.020	mg/l	0.023	SW 8270	200.0
1,4-DICHLOROBENZENE	0.020	mg/l	ND	SW 8270	7.5
2,4-DINITROTOLUENE	0.020	mg/l	ND	SW 8270	0.13
HEXACHLOROBENZENE	0.020	mg/l	ND	SW 8270	0.13
NITROBENZENE	0.020	mg/l	ND	SW 8270	2.0
PENTACHLOROPHENOL	0.020	mg/l	ND	SW 8270	100.0
2,4,5-TRICHLOROPHENOL	0.020	mg/l	ND	SW 8270	400.0
2,4,6-TRICHLOROPHENOL	0.020	mg/l	ND	SW 8270	2.0
HEXACHLOROBUTADIENE	0.020	mg/l	ND	SW 8270	0.5
HEXACHLOROETHANE	0.020	mg/l	ND	SW 8270	3.0
PYRIDINE	0.020	mg/l	ND	SW 8270	5.0

QA/QC SURROGATE RECOVERIES

NITROBENZENE-d5	(35-114)	51%	2-FLUOROBIPHENYL	(43-116)	32%*	TERPHENYL-d14	(33-141) 65%
PHENOL-d5	(10-94)	56%	2-FLUOROPHENOL	(21-100)	50%	2,4,6-TRIBROMOPHENOL	(10-123) 54%

(1) = FEDERAL REGISTER 40 CFR PART 261 THURSDAY, MARCH 29, 1990
TABLE IV-3. PAGE 11845 AND 11846
(2) = M-CRESOL AND P-CRESOL COELUTE
D = SURROGATES DILUTED OUT; EXTRACT WAS DILUTED DUE TO PRESENCE OF A UNKNOWN PEAK AT HIGH LEVELS
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** = COMBINATIONS OF O, M, AND P CRESOLS
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
SW = EPA METHODOLOGY "#SW846", THIRD EDITION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

CLIENT: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: TOM REED

REPORT: 9900.12BT-RE

DATE: 07-07-92

SAMPLE MATRIX: SLUDGE, TCLP EXTRACTION
SWLO # 9900.12 REEXTRACTION
DATE SAMPLED: 06-09-92
DATE SUBMITTED: 06-10-92
TCLP EXTRACT DATE: 06-11-92
DATE EXTRACTED: 06-24-92
DATE ANALYZED: 07-01-92
DILUTION FACTOR: 2
PROJECT: 80-37-03 GEN; WYNNEWOOD, OK SPECIAL
SAMPLE ID: STORMWATER RETURN PD

PARAMETER	QUANT. LIMIT	UNIT	RESULTS	METHOD REFERENCE	REGULATORY (1) LEVEL (mg/L)
TCLP SEMI-VOLATILES					
O-CRESOL	0.020	mg/l	0.002 J	SW 8270	200.0
M-CRESOL (2)	0.020	mg/l	ND	SW 8270	200.0
P-CRESOL (2)	0.020	mg/l	0.034	SW 8270	200.0
TOTAL CRESOL'S**	0.020	mg/l	0.036	SW 8270	200.0
1,4-DICHLOROBENZENE	0.020	mg/l	ND	SW 8270	7.5
2,4-DINITROTOLUENE	0.020	mg/l	ND	SW 8270	0.13
HEXACHLOROBENZENE	0.020	mg/l	ND	SW 8270	0.13
NITROBENZENE	0.020	mg/l	ND	SW 8270	2.0
PENTACHLOROPHENOL	0.020	mg/l	ND	SW 8270	100.0
2,4,5-TRICHLOROPHENOL	0.020	mg/l	ND	SW 8270	400.0
2,4,6-TRICHLOROPHENOL	0.020	mg/l	ND	SW 8270	2.0
HEXACHLOROBUTADIENE	0.020	mg/l	ND	SW 8270	0.5
HEXACHLOROETHANE	0.020	mg/l	ND	SW 8270	3.0
PYRIDINE	0.020	mg/l	ND	SW 8270	5.0

QA/QC SURROGATE RECOVERIES

NITROBENZENE-d5	(35-114) 92%	2-FLUOROBIPHENYL	(43-116) 83%	TERPHENYL-d14	(33-141) 97%
PHENOL-d5	(10-94) 72%	2-FLUOROPHENOL	(21-100) 72%	2,4,6-TRIBROMOPHENOL	(10-123) 81%

(1) = FEDERAL REGISTER 40 CFR PART 261 THURSDAY, MARCH 29, 1990
TABLE IV-3. PAGE 11845 AND 11846
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B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
SW = EPA METHODOLOGY "#SW846", THIRD EDITION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

CLIENT: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: TOM REED

REPORT: 9913.02VT

DATE: 06-30-92

SAMPLE MATRIX: SLUDGE, TCLP EXTRACTION
SWLO # 9913.02
DATE SAMPLED: 06-10-92
DATE SUBMITTED: 06-11-92
TCLP EXTRACT DATE: 06-15-92
DATE ANALYZED: 06-18-92
METHOD REFERENCE: SW846-8240, EPA METHODOLOGY
DILUTION FACTOR: 5
PROJECT: 80-37-03 GEN; WYNNEWOOD, OK SPECIAL
SAMPLE ID: STORM WATER N

RESULTS REPORTED IN mg/l OR Parts Per Million (PPM)

VOLATILES	QUANT. LIMIT	RESULTS	REGULATORY (1) LEVEL (mg/L)
BENZENE	0.025	ND	0.5
CARBON TETRA CHLORIDE	0.025	ND	0.5
CHLOROBENZENE	0.025	ND	100.0
CHLOROFORM	0.025	ND	6.0
1,2-DICHLOROETHANE	0.025	ND	0.5
1,1-DICHLOROETHYLENE	0.025	ND	0.7
TETRACHLOROETHYLENE	0.025	ND	0.7
TRICHLOROETHYLENE	0.025	ND	0.5
VINYL CHLORIDE	0.050	ND	0.2
METHYL ETHYL KETONE	0.050	ND	200.0

QA/QC SURROGATE RECOVERIES

TOLUENE-d8(88-110) 103% BROMOFLUOROBENZENE(86-115) 100% 1,2-DICHLOROETHANE-d4(76-114) 90%

(1) = FEDERAL REGISTER 40 CFR PART 261 THURSDAY, MARCH 29, 1990
TABLE IV-3. PAGE 11845 AND 11846
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B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

CLIENT: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: TOM REED

REPORT: 9913.02BT

DATE: 06-30-92

SAMPLE MATRIX: SLUDGE, TCLP EXTRACTION
SWLO # 9913.02
DATE SAMPLED: 06-10-92
DATE SUBMITTED: 06-11-92
TCLP EXTRACT DATE: 06-12-92
DATE EXTRACTED: 06-15-92
DATE ANALYZED: 06-24-92
DILUTION FACTOR: 2
PROJECT: 80-37-03 GEN; WYNNEWOOD, OK SPECIAL
SAMPLE ID: STORM WATER N

PARAMETER	QUANT. LIMIT	UNIT	RESULTS	METHOD REFERENCE	REGULATORY (1) LEVEL (mg/L)
TCLP SEMI-VOLATILES					
O-CRESOL	0.020	mg/l	ND	SW 8270	200.0
M-CRESOL (2)	0.020	mg/l	ND	SW 8270	200.0
P-CRESOL (2)	0.020	mg/l	ND	SW 8270	200.0
TOTAL CRESOL'S**	0.020	mg/l	ND	SW 8270	200.0
1,4-DICHLOROBENZENE	0.020	mg/l	ND	SW 8270	7.5
2,4-DINITROTOLUENE	0.020	mg/l	ND	SW 8270	0.13
HEXACHLOROBENZENE	0.020	mg/l	ND	SW 8270	0.13
NITROBENZENE	0.020	mg/l	ND	SW 8270	2.0
PENTACHLOROPHENOL	0.020	mg/l	ND	SW 8270	100.0
2,4,5-TRICHLOROPHENOL	0.020	mg/l	ND	SW 8270	400.0
2,4,6-TRICHLOROPHENOL	0.020	mg/l	ND	SW 8270	2.0
HEXACHLOROBUTADIENE	0.020	mg/l	ND	SW 8270	0.5
HEXACHLOROETHANE	0.020	mg/l	ND	SW 8270	3.0
PYRIDINE	0.020	mg/l	ND	SW 8270	5.0

QA/QC SURROGATE RECOVERIES

NITROBENZENE-d5	(35-114)	83%	2-FLUOROBIPHENYL	(43-116)	73%	TERPHENYL-d14	(33-141) 89%
PHENOL-d5	(10-94)	76%	2-FLUOROPHENOL	(21-100)	81%	2,4,6-TRIBROMOPHENOL	(10-123) 71%

(1) = FEDERAL REGISTER 40 CFR PART 261 THURSDAY, MARCH 29, 1990
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ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
SW = EPA METHODOLOGY "#SW846", THIRD EDITION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

CLIENT: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: TOM REED

REPORT: 9913.01VT

DATE: 06-30-92

SAMPLE MATRIX: SLUDGE, TCLP EXTRACTION
SWLO # 9913.01
DATE SAMPLED: 06-10-92
DATE SUBMITTED: 06-11-92
TCLP EXTRACT DATE: 06-15-92
DATE ANALYZED: 06-18-92
METHOD REFERENCE: SW846-8240, EPA METHODOLOGY
DILUTION FACTOR: 5
PROJECT: 80-37-03 GEN; WYNNEWOOD, OK SPECIAL
SAMPLE ID: STORM WATER S

RESULTS REPORTED IN mg/l OR Parts Per Million (PPM)

VOLATILES	QUANT. LIMIT	RESULTS	REGULATORY (1) LEVEL (mg/L)
BENZENE	0.025	ND	0.5
CARBON TETRA CHLORIDE	0.025	ND	0.5
CHLOROBENZENE	0.025	ND	100.0
CHLOROFORM	0.025	ND	6.0
1,2-DICHLOROETHANE	0.025	ND	0.5
1,1-DICHLOROETHYLENE	0.025	ND	0.7
TETRACHLOROETHYLENE	0.025	ND	0.7
TRICHLOROETHYLENE	0.025	ND	0.5
VINYL CHLORIDE	0.050	ND	0.2
METHYL ETHYL KETONE	0.050	ND	200.0

QA/QC SURROGATE RECOVERIES

TOLUENE-d8(88-110) 104% BROMOFLUOROBENZENE(86-115) 102% 1,2-DICHLOROETHANE-d4(76-114) 93%

(1) = FEDERAL REGISTER 40 CFR PART 261 THURSDAY, MARCH 29, 1990
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B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

CLIENT: KERR MCGEE REFINING
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: TOM REED

REPORT: 9913.01BT

DATE: 06-30-92

SAMPLE MATRIX: SLUDGE, TCLP EXTRACTION
SWLO # 9913.01
DATE SAMPLED: 06-10-92
DATE SUBMITTED: 06-11-92
TCLP EXTRACT DATE: 06-12-92
DATE EXTRACTED: 06-15-92
DATE ANALYZED: 06-24-92
DILUTION FACTOR: 2
PROJECT: 80-37-03 GEN; WYNNEWOOD, OK SPECIAL
SAMPLE ID: STORM WATER S

PARAMETER	QUANT. LIMIT	UNIT	RESULTS	METHOD REFERENCE	REGULATORY (1) LEVEL (mg/L)
TCLP SEMI-VOLATILES					
O-CRESOL	0.020	mg/l	0.002 J	SW 8270	200.0
M-CRESOL (2)	0.020	mg/l	ND	SW 8270	200.0
P-CRESOL (2)	0.020	mg/l	0.054	SW 8270	200.0
TOTAL CRESOL'S**	0.020	mg/l	0.056	SW 8270	200.0
1,4-DICHLOROBENZENE	0.020	mg/l	ND	SW 8270	7.5
2,4-DINITROTOLUENE	0.020	mg/l	ND	SW 8270	0.13
HEXACHLOROBENZENE	0.020	mg/l	ND	SW 8270	0.13
NITROBENZENE	0.020	mg/l	ND	SW 8270	2.0
PENTACHLOROPHENOL	0.020	mg/l	ND	SW 8270	100.0
2,4,5-TRICHLOROPHENOL	0.020	mg/l	ND	SW 8270	400.0
2,4,6-TRICHLOROPHENOL	0.020	mg/l	ND	SW 8270	2.0
HEXACHLOROBUTADIENE	0.020	mg/l	ND	SW 8270	0.5
HEXACHLOROETHANE	0.020	mg/l	ND	SW 8270	3.0
PYRIDINE	0.020	mg/l	ND	SW 8270	5.0

QA/QC SURROGATE RECOVERIES

NITROBENZENE-d5	(35-114)	83%	2-FLUOROBIPHENYL	(43-116)	78%	TERPHENYL-d14	(33-141)	96%
PHENOL-d5	(10-94)	78%	2-FLUOROPHENOL	(21-100)	85%	2,4,6-TRIBROMOPHENOL	(10-123)	80%

(1) = FEDERAL REGISTER 40 CFR PART 261 THURSDAY, MARCH 29, 1990
TABLE IV-3. PAGE 11845 AND 11846
(2) = M-CRESOL AND P-CRESOL COELUTE
D = SURROGATES DILUTED OUT; EXTRACT WAS DILUTED DUE TO PRESENCE OF A UNKNOWN PEAK AT HIGH LEVELS
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B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
SW = EPA METHODOLOGY "#SW846", THIRD EDITION

APPENDIX B

ANALYTICAL RESULTS FROM MULTIMEDIA REPORT

SOUTHWEST LABORATORY OF OKLAHOMA, INC
[illegible]0 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-259[illegible]

ORGANICS CLP QUALIFIER FLAGS - SOW 2/88

The seven EPA-defined qualifiers to be used are as follows:

U	Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. For example, 10 U for phenol in water if the sample final volume is the protocol-specified final volume. If a 1 to 10 dilution of extract is necessary, the reported limit is 100 U. For a soil sample, the value must also be adjusted for percent moisture. For example, if the sample had 24% moisture and a 1 to 10 dilution factor, the sample quantitation limit for phenol (330 U) would be corrected to: $\frac{(330\ U)}{D} \times df$ where $D = \frac{100 - \%\ moisture}{100}$ and df = dilution factor at 24% moisture, $D = \frac{100-24}{100} = 0.76$ $\frac{(330\ U)}{76} \times 10 = 4300$ U rounded to the appropriate number of significant figures
J	Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identify compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero. For example, if the sample quantitation limit is 10 ug/L, but a concentration of 3 ug/L is calculated, report it as 3J. The sample quantitation limit must be adjusted for both dilution and percent moisture as discussed for the U flag, so that if a sample with 24% moisture and a 1 to 10 dilution factor has a calculated concentration as 300J on Form I.
C	This flag applies to pesticide results where the identification has been confirmed by GC/MS. Single component pesticides >10 ng/ul in the final extract shall be confirmed by GC/MS.
B	This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action. This flag must be used for a TIC as well as for a positively identified TCL compound.
E	This flag identifies compounds whose concentrations exceed the calibration range of the instrument for that specific analysis. If one or more compounds have a response greater than full scale, the sample or extract must be diluted and reanalyzed according to the specifications in Exhibit D. All such compounds with a response greater than full scale should have the concentration flagged with an "E" on the Form I for the original analysis. If the dilution of the extract causes any compounds identified in the first analysis to be below the calibration range in the second analysis, then the results of both analyses shall be reported on separate Forms I. The Form I for the diluted sample shall have the "DL" suffix appended to the sample number.
D	This flag identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is reanalyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the "D" flag.
A	This flag indicates that a TIC is a suspected aldol-condensation product.
X	Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such descriptions attached to the Sample Data Summary Package and the Case Narrative. If more than one is required, use "Y" and "Z", as needed. If more than five qualifiers are required for a sample result, use the "X' flag to combine several flags, as needed. For instance, the "X" flag might combine the "A", "B", and "D" flags for some sample.

SOUTHWEST LABORATORY OF OKLAHOMA, INC
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INORGANICS CLP QUALIFIER FLAGS

B	The reported values was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL), if the analyte was analyzed for but not detected, a "U" must be entered.
E	The reported value is estimated because of the presence of interference. An explanatory note must be included under Comments on the Cover Page (if the problem applies to all samples) or on the specific FORM I - IN (if it is an isolated problem).
M	Duplicate injection precision not met.
N	Spike sample recovery not within control limits.
S	The reported value was determined by the Method of Standard Additions (MSA).
W	Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance. (See Exhibit E.)
*	Duplicate analysis not within control limits.
+	Correlation coefficient for the MSA is less than 0.995.

U.S. EPA - CLP

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MK000005

Name: SOUTHWEST LAB. OF OK Contract:

Code: SWOK Case No.: 9900 SAS No.: SDG No.: MK0001

rix (soil/water): WATER Lab Sample ID: 990006

el (low/med): LOW Date Received: 5/10/92

olids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4750.00		E	P
7440-36-0	Antimony	16.00	U	N	P
7440-38-2	Arsenic	11.30		N	F
7440-39-3	Barium	156.00	B		P
7440-41-7	Beryllium	1.00	U		P
7440-43-9	Cadmium	2.00	U		P
7440-70-2	Calcium	49100.00			P
7440-47-3	Chromium	66.10			P
7440-48-4	Cobalt	6.20	B		P
7440-50-8	Copper	52.90			P
7439-89-6	Iron	3950.00		E	P
7439-92-1	Lead	42.50		NS*	F
7439-95-4	Magnesium	4750.00	B		P
7439-96-5	Manganese	195.00			P
7439-97-6	Mercury	.42			CV
7440-02-0	Nickel	11.30	B		P
7440-09-7	Potassium	2860.00	B		P
7782-49-2	Selenium	4.00	U		F
7440-22-4	Silver	1.00	B	N	P
7440-23-5	Sodium	14400.00			P
7440-28-0	Thallium	2.00	U	NW	F
7440-62-2	Vanadium	17.60	B		P
7440-66-6	Zinc	249.00			P
	Cyanide	*			NR

lor Before: BROWN Clarity Before: CLOUDY Texture:

lor After: COLORLESS Clarity After: CLEAR Artifacts:

mments:
) SAMPLE ID MK0006 = CLIENT ID STORM WATER RET POND

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

STORM WATER RETPOND

Name: SWL-TULSA Contract: KERR

Code: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

Matrix: (soil/water) WATER Lab Sample ID: 990006

Sample wt/vol: 3.0 (g/mL) ML Lab File ID: CN308

Level: (low/med) LOW Date Received: 06/10/92

% Moisture: not dec. _____ Date Analyzed: 06/11/92

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	17	U
74-83-9	Bromomethane	17	U
75-01-4	Vinyl Chloride	17	U
75-00-3	Chloroethane	17	U
75-09-2	Methylene Chloride	8	U
67-64-1	Acetone	160	
75-15-0	Carbon Disulfide	8	U
75-35-4	1,1-Dichloroethene	8	U
75-34-3	1,1-Dichloroethane	8	U
540-59-0	1,2-Dichloroethene (total)	8	U
67-66-3	Chloroform	8	U
107-06-2	1,2-Dichloroethane	8	U
78-93-3	2-Butanone	17	U
71-55-6	1,1,1-Trichloroethane	8	U
56-23-5	Carbon Tetrachloride	8	U
108-05-4	Vinyl Acetate	17	U
75-27-4	Bromodichloromethane	8	U
78-87-5	1,2-Dichloropropane	8	U
10061-01-5	cis-1,3-Dichloropropene	8	U
79-01-6	Trichloroethene	8	U
124-48-1	Dibromochloromethane	8	U
79-00-5	1,1,2-Trichloroethane	8	U
71-43-2	Benzene	16	
10061-02-6	trans-1,3-Dichloropropene	8	U
75-25-2	Bromoform	8	U
108-10-1	4-Methyl-2-Pentanone	17	U
591-78-6	2-Hexanone	17	U
127-18-4	Tetrachloroethene	8	U
79-34-5	1,1,2,2-Tetrachloroethane	8	U
108-88-3	Toluene	11	
108-90-7	Chlorobenzene	8	U
100-41-4	Ethylbenzene	8	U
100-42-5	Styrene	8	U
1330-20-7	Xylene (total)	8	
541-73-1	1,4-Dichlorobenzene	17	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

STORM WATER RETPOND

Lab Name: SWL-TULSA Contract: KERR

Lab Code: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

Matrix: (soil/water) WATER Lab Sample ID: 990006

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P1316

Level: (low/med) LOW Date Received: 06/10/92

% Moisture: not dec. ____ dec. ____ Date Extracted: 06/10/92

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 06/22/92

GPC Cleanup: (Y/N) N pH: 7.7 Dilution Factor: 20

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
108-95-2	Phenol	200	U
111-44-4	bis(2-Chloroethyl)Ether	200	U
95-57-8	2-Chlorophenol	200	U
541-73-1	1,3-Dichlorobenzene	200	U
106-46-7	1,4-Dichlorobenzene	200	U
100-51-6	Benzyl Alcohol	200	U
95-50-1	1,2-Dichlorobenzene	200	U
95-48-7	2-Methylphenol	200	U
39638-32-9	bis(2-Chloroisopropyl)Ether	200	U
106-44-5	4-Methylphenol	200	U
621-64-7	N-Nitroso-Di-n-Propylamine	200	U
67-72-1	Hexachloroethane	200	U
98-95-3	Nitrobenzene	200	U
78-59-1	Isophorone	200	U
88-75-5	2-Nitrophenol	200	U
105-67-9	2,4-Dimethylphenol	200	U
65-85-0	Benzoic Acid	1000	U
111-91-1	bis(2-Chloroethoxy)Methane	200	U
120-83-2	2,4-Dichlorophenol	200	U
120-82-1	1,2,4-Trichlorobenzene	200	U
91-20-3	Naphthalene	51	J
106-47-8	4-Chloroaniline	200	U
87-68-3	Hexachlorobutadiene	200	U
59-50-7	4-Chloro-3-Methylphenol	200	U
91-57-6	2-Methylnaphthalene	390	
77-47-4	Hexachlorocyclopentadiene	200	U
88-06-2	2,4,6-Trichlorophenol	200	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	200	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	200	U
208-96-8	Acenaphthylene	200	U
606-20-2	2,6-Dinitrotoluene	200	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

STORM WATER RETPOND

Lab Name: SWL-TULSA Contract: KERR

Lab Code: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

Matrix: (soil/water) WATER Lab Sample ID: 990006

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P1316

Level: (low/med) LOW Date Received: 06/10/92

% Moisture: not dec. ____ dec. ____ Date Extracted: 06/10/92

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 06/22/92

GPC Cleanup: (Y/N) N pH: 7.7 Dilution Factor: 20

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	89	J
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	200	U
121-14-2	2,4-Dinitrotoluene	200	U
84-66-2	Diethylphthalate	200	U
7005-72-3	4-Chlorophenyl-phenylether	200	U
86-73-7	Fluorene	60	J
100-10-6	4-Nitroaniline	1000	U
534-52-1	4,6-Dinitro-2-Methylphenol	1000	U
86-30-6	N-Nitrosodiphenylamine (1)	200	U
101-55-3	4-Bromophenyl-phenylether	200	U
118-74-1	Hexachlorobenzene	200	U
87-86-5	Pentachlorophenol	1000	U
85-01-8	Phenanthrene	230	
120-12-7	Anthracene	23	J
86-74-8	Carbazole	200	U
84-74-2	Di-n-Butylphthalate	200	U
206-44-0	Fluoranthene	16	J
129-00-0	Pyrene	80	J
85-68-7	Butylbenzylphthalate	200	U
91-94-1	3,3'-Dichlorobenzidine	400	U
56-55-3	Benzo(a)Anthracene	200	U
218-01-9	Chrysene	200	U
117-81-7	bis(2-Ethylhexyl)Phthalate	200	U
117-84-0	Di-n-Octyl Phthalate	200	U
205-99-2	Benzo(b)Fluoranthene	200	U
207-08-9	Benzo(k)Fluoranthene	200	U
50-32-8	Benzo(a)Pyrene	200	U
193-39-5	Indeno(1,2,3-cd)Pyrene	200	U
53-70-3	Dibenz(a,h)Anthracene	200	U
191-24-2	Benzo(g,h,i)Perylene	200	U

(1) - Cannot be separated from Diphenylamine

EPA SAMPLE NO.

STORM WATER RETPOND

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Name: SWL-TULSA Contract: KERR

Lab Code: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

Matrix: (soil/water) WATER Lab Sample ID: 990006

Sample wt/vol: 3.0 (g/mL) ML Lab File ID: CN308

Level: (low/med) LOW Date Received: 06/10/92

% Moisture: not dec. _____ Date Analyzed: 06/11/92

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 6

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	5.73	43	J
2.	UNKOWN ALKYLBENZENE	21.47	12	J
3.	UNKOWN ALKYLBENZENE	22.27	8.4	J
4.	UNKNOWN	23.17	8.4	J
5.	UNKNOWN	24.32	57	J
6.	UNKNOWN	24.77	10	J

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
STORM WATER RETPOND

Lab Name: SWL-TULSA Contract: KERR

Lab Code: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

Matrix: (soil/water) WATER Lab Sample ID: 990006

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P1316

Level: (low/med) LOW Date Received: 06/10/92

% Moisture: not dec. ____ dec. ____ Date Extracted: 06/10/92

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 06/22/92

GPC Cleanup: (Y/N) N pH: 7.7 Dilution Factor: 20

Number TICs found: 20

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN ALKANE	13.67	300	J
2.	UNKNOWN ALKANE	14.04	840	J
3.	1H-Indene, -ethylidene-	14.40	260	J
4.	UNKNOWN ALKANE	15.32	520	J
5.	Naphthalene, -ethyl-	15.44	140	J
6.	Naphthalene, -dimethyl-	15.59	380	J
7.	Naphthalene, -dimethyl-	15.77	480	J
8.	Naphthalene, -dimethyl-	15.82	160	J
9.	Naphthalene, -trimethyl-	16.74	180	J
10.	Naphthalene, -trimethyl-	16.97	280	J
11.	Naphthalene, -trimethyl-	17.04	120	J
12.	UNKNOWN ALKANE	17.54	100	J
13.	UNKNOWN ALKANE	18.60	1200	J
14.	UNKNOWN ALKANE	19.59	1000	J
15.	UNKNOWN ALKANE	20.52	1500	J
16.	UNKNOWN ALKANE	21.42	1100	J
17.	UNKNOWN ALKANE	22.25	1300	J
18.	UNKNOWN ALKANE	23.07	1400	J
19.	UNKNOWN ALKANE	23.84	1000	J
20.	UNKNOWN ALKANE	24.57	880	J

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

STORM WATER RETPOND

Lab Name: SWL-TULSA Contract: KERR

Lab Code: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

Matrix: (soil/water) ~~SOIL~~ dac Lab Sample ID: 990006

Sample wt/vol: 1.0 (g/mL) G Lab File ID: FJ576

Level: (low/med) MED Date Received: 06/10/92

% Moisture: not dec. ____ dec. ____ Date Extracted: 06/10/92

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/12/92

GPC Cleanup: (Y/N) Y pH: _____ Dilution Factor: ~~5.0~~ 10 dac

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	200000	U
111-44-4	bis(2-Chloroethyl)Ether	200000	U
95-57-8	2-Chlorophenol	200000	U
541-73-1	1,3-Dichlorobenzene	200000	U
106-46-7	1,4-Dichlorobenzene	200000	U
100-51-6	Benzyl Alcohol	200000	U
95-50-1	1,2-Dichlorobenzene	200000	U
95-48-7	2-Methylphenol	200000	U
39638-32-9	bis(2-Chloroisopropyl)Ether	200000	U
106-44-5	4-Methylphenol	200000	U
621-64-7	N-Nitroso-Di-n-Propylamine	200000	U
67-72-1	Hexachloroethane	200000	U
98-95-3	Nitrobenzene	200000	U
78-59-1	Isophorone	200000	U
88-75-5	2-Nitrophenol	200000	U
105-67-9	2,4-Dimethylphenol	200000	U
65-85-0	Benzoic Acid	960000	U
111-91-1	bis(2-Chloroethoxy)Methane	200000	U
120-83-2	2,4-Dichlorophenol	200000	U
120-82-1	1,2,4-Trichlorobenzene	200000	U
91-20-3	Naphthalene	58000	J
106-47-8	4-Chloroaniline	200000	U
87-68-3	Hexachlorobutadiene	200000	U
59-50-7	4-Chloro-3-Methylphenol	200000	U
91-57-6	2-Methylnaphthalene	490000	
77-47-4	Hexachlorocyclopentadiene	200000	U
88-06-2	2,4,6-Trichlorophenol	200000	U
95-95-4	2,4,5-Trichlorophenol	960000	U
91-58-7	2-Chloronaphthalene	200000	U
88-74-4	2-Nitroaniline	960000	U
131-11-3	Dimethylphthalate	200000	U
208-96-8	Acenaphthylene	200000	U
606-20-2	2,6-Dinitrotoluene	200000	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

STORM WATER RETPOND

Lab Name: SWL-TULSA Contract: KERR

Lab Code: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

Matrix: (soil/water) ~~SOIL~~ dac Lab Sample ID: 990006

Sample wt/vol: 1.0 (g/mL) G Lab File ID: FJ576

Level: (low/med) MED Date Received: 06/10/92

% Moisture: not dec. ____ dec. ____ Date Extracted: 06/10/92

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/12/92

GPC Cleanup: (Y/N) Y pH: _____ Dilution Factor: ~~5.0~~ 10 dac

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	960000	U
83-32-9	Acenaphthene	95000	J
51-28-5	2,4-Dinitrophenol	960000	U
100-02-7	4-Nitrophenol	960000	U
132-64-9	Dibenzofuran	48000	J
121-14-2	2,4-Dinitrotoluene	200000	U
84-66-2	Diethylphthalate	200000	U
7005-72-3	4-Chlorophenyl-phenylether	200000	U
86-73-7	Fluorene	200000	U
100-10-6	4-Nitroaniline	960000	U
534-52-1	4,6-Dinitro-2-Methylphenol	960000	U
86-30-6	N-Nitrosodiphenylamine (1)	200000	U
101-55-3	4-Bromophenyl-phenylether	200000	U
118-74-1	Hexachlorobenzene	200000	U
87-86-5	Pentachlorophenol	960000	U
85-01-8	Phenanthrene	440000	
120-12-7	Anthracene	82000	J
86-74-8	Carbazole	100000	U
84-74-2	Di-n-Butylphthalate	200000	U
206-44-0	Fluoranthene	200000	U
129-00-0	Pyrene	120000	J
85-68-7	Butylbenzylphthalate	200000	U
91-94-1	3,3'-Dichlorobenzidine	400000	U
56-55-3	Benzo(a)Anthracene	200000	U
218-01-9	Chrysene	29000	J
117-81-7	bis(2-Ethylhexyl)Phthalate	200000	U
117-84-0	Di-n-Octyl Phthalate	200000	U
205-99-2	Benzo(b)Fluoranthene	200000	U
207-08-9	Benzo(k)Fluoranthene	200000	U
50-32-8	Benzo(a)Pyrene	200000	U
193-39-5	Indeno(1,2,3-cd)Pyrene	200000	U
53-70-3	Dibenz(a,h)Anthracene	200000	U
191-24-2	Benzo(g,h,i)Perylene	200000	U

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

STORM WATER RETPOND

Lab Name: SWL-TULSA Contract: KERR

Lab Code: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

Matrix: (soil/water) ~~SOIL~~ dac Lab Sample ID: 990006

Sample wt/vol: 1.0 (g/mL) G Lab File ID: FJ576

Level: (low/med) MED Date Received: 06/10/92

% Moisture: not dec. ____ dec. ____ Date Extracted: 06/10/92

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/12/92

GPC Cleanup: (Y/N) Y pH: _____ Dilution Factor: ~~5.0~~ 10 dac

Number TICs found: 20

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN ALKANE	11.62	980000	J
2. 629594	Tetradecane	14.17	2200000	J
3.	Naphthalene, -dimethyl-	14.34	1100000	J
4.	Naphthalene, -dimethyl-	14.52	1100000	J
5.	Naphthalene, -dimethyl-	14.57	520000	J
6.	Naphthalene, -dimethyl-	14.75	920000	J
7. 544763	Hexadecane	14.84	520000	J
8.	UNKNOWN ALKANE	15.32	1200000	J
9.	Naphthalene, -trimethyl-	15.49	480000	J
10.	Naphthalene, -trimethyl-	15.79	400000	J
11.	Naphthalene, -trimethyl-	15.92	460000	J
12.	Naphthalene, -trimethyl-	15.99	560000	J
13.	UNKNOWN ALKANE	16.84	260000	J
14.	UNKNOWN ALKANE	17.40	1000000	J
15.	UNKNOWN ALKANE	19.29	720000	J
16.	UNKNOWN ALKANE	20.17	760000	J
17.	Phenanthrene,-dimethyl-	20.67	340000	J
18.	UNKNOWN ALKANE	21.02	640000	J
19.	UNKNOWN ALKANE	22.57	760000	J
20.	UNKNOWN ALKANE	23.29	500000	J

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

STORM WATER RETPONDMSD

me: SWL-TULSA Contract: KERR

ie: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

: (soil/water) ~~SOIL~~ dac Lab Sample ID: 990006MSD

wt/vol: 1.0 (g/mL) G Lab File ID: FJ594

(low/med) MED Date Received: 06/10/92

ure: not dec. ____ dec. ____ Date Extracted: 06/10/92

ion: (SepF/Cont/Sonc) SONC Date Analyzed: 06/15/92

anup: (Y/N) Y pH: _____ Dilution Factor: ~~5.0~~ 10 dac

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	200000	U
111-44-4	bis(2-Chloroethyl)Ether	200000	U
95-57-8	2-Chlorophenol	200000	U
541-73-1	1,3-Dichlorobenzene	200000	U
106-46-7	1,4-Dichlorobenzene	200000	U
100-51-6	Benzyl Alcohol	200000	U
95-50-1	1,2-Dichlorobenzene	200000	U
95-48-7	2-Methylphenol	200000	U
39638-32-9	bis(2-Chloroisopropyl)Ether	200000	U
106-44-5	4-Methylphenol	200000	U
621-64-7	N-Nitroso-Di-n-Propylamine	200000	U
67-72-1	Hexachloroethane	200000	U
98-95-3	Nitrobenzene	200000	U
78-59-1	Isophorone	200000	U
88-75-5	2-Nitrophenol	200000	U
105-67-9	2,4-Dimethylphenol	200000	U
65-85-0	Benzoic Acid	960000	U
111-91-1	bis(2-Chloroethoxy)Methane	200000	U
120-83-2	2,4-Dichlorophenol	200000	U
120-82-1	1,2,4-Trichlorobenzene	200000	U
91-20-3	Naphthalene	56000	J
106-47-8	4-Chloroaniline	200000	U
87-68-3	Hexachlorobutadiene	200000	U
59-50-7	4-Chloro-3-Methylphenol	200000	U
91-57-6	2-Methylnaphthalene	550000	
77-47-4	Hexachlorocyclopentadiene	200000	U
88-06-2	2,4,6-Trichlorophenol	200000	U
95-95-4	2,4,5-Trichlorophenol	960000	U
91-58-7	2-Chloronaphthalene	200000	U
88-74-4	2-Nitroaniline	960000	U
131-11-3	Dimethylphthalate	200000	U
208-96-8	Acenaphthylene	200000	U
606-20-2	2,6-Dinitrotoluene	200000	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

STORM WATER
RETPONDMSD

me: SWL-TULSA Contract: KERR

de: SWOK Case No.: KERR1 SAS No.: _____ SDG No.: 9900

x: (soil/water) ~~SOIL~~ dec Lab Sample ID: 990006MSD

wt/vol: 1.0 (g/mL) G Lab File ID: FJ594

(low/med) MED Date Received: 06/10/92

ture: not dec. ____ dec. ____ Date Extracted: 06/10/92

tion: (SepF/Cont/Sonc) SONC Date Analyzed: 06/15/92

eanup: (Y/N) Y pH: _____ Dilution Factor: ~~5.0~~ 10 dec

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	960000	U
83-32-9	Acenaphthene	200000	U
51-28-5	2,4-Dinitrophenol	960000	U
100-02-7	4-Nitrophenol	960000	U
132-64-9	Dibenzofuran	200000	U
121-14-2	2,4-Dinitrotoluene	200000	U
84-66-2	Diethylphthalate	200000	U
7005-72-3	4-Chlorophenyl-phenylether	200000	U
86-73-7	Fluorene	200000	U
100-10-6	4-Nitroaniline	960000	U
534-52-1	4,6-Dinitro-2-Methylphenol	960000	U
86-30-6	N-Nitrosodiphenylamine (1)	200000	U
101-55-3	4-Bromophenyl-phenylether	200000	U
118-74-1	Hexachlorobenzene	200000	U
87-86-5	Pentachlorophenol	960000	U
85-01-8	Phenanthrene	440000	
120-12-7	Anthracene	84000	J
86-74-8	Carbazole	100000	U
84-74-2	Di-n-Butylphthalate	200000	U
206-44-0	Fluoranthene	200000	U
129-00-0	Pyrene	200000	U
85-68-7	Butylbenzylphthalate	200000	U
91-94-1	3,3'-Dichlorobenzidine	400000	U
56-55-3	Benzo(a)Anthracene	200000	U
218-01-9	Chrysene	31000	J
117-81-7	bis(2-Ethylhexyl)Phthalate	200000	U
117-84-0	Di-n-Octyl Phthalate	200000	U
205-99-2	Benzo(b)Fluoranthene	200000	U
207-08-9	Benzo(k)Fluoranthene	200000	U
50-32-8	Benzo(a)Pyrene	200000	U
193-39-5	Indeno(1,2,3-cd)Pyrene	200000	U
53-70-3	Dibenz(a,h)Anthracene	200000	U
191-24-2	Benzo(g,h,i)Perylene	200000	U

1) - Cannot be separated from Diphenylamine

APPENDIX C

ANALYTICAL RESULTS FROM RFI REPORT

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: KERR-McGEE CORPORATION
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: JEFF LUX

REPORT: 2020.77

DATE: 07-14-89

SAMPLE MATRIX: SOIL
SWLO # 27386
DATE SUBMITTED: 06-15-89
PROJECT: REFINING FACILITY; WYNNEWOOD, OKLAHOMA
SAMPLE ID: LM COMPOSITE #1

PARAMETER	DET. LIMIT	UNIT	RESULTS	DATE ANALYZED	METHOD REFERENCE
IGNITABILITY	N/A	°F	>200	06-20-89	SW 1010
EP TOXICITY METALS					
ARSENIC	0.035	mg/L	ND	06-22-89	SW 6010
BARIUM	0.02	mg/L	1.09	06-22-89	SW 6010
CADMIUM	0.005	mg/L	ND	06-22-89	SW 6010
CHROMIUM	0.005	mg/L	ND	06-22-89	SW 6010
LEAD	0.02	mg/L	ND	06-22-89	SW 6010
MERCURY	0.05	mg/L	ND	06-22-89	SW 6010
SELENIUM	0.03	mg/L	ND	06-22-89	SW 6010
SILVER	0.01	mg/L	ND	06-22-89	SW 6010
TOTAL METALS (SKINNER'S LIST)					
ANTIMONY	6.0	mg/Kg	8.0	06-22-89	SW 6010
ARSENIC	2.0	mg/Kg	2.40	06-22-89	SW 7060
BARIUM	4.0	mg/Kg	129.0	06-22-89	SW 6010
BERYLLIUM	1.0	mg/Kg	ND	06-22-89	SW 6010
CADMIUM	1.0	mg/Kg	ND	06-22-89	SW 6010
CHROMIUM	1.0	mg/Kg	75.0	06-22-89	SW 6010
COBALT	2.0	mg/Kg	5.0	06-22-89	SW 6010
LEAD	0.6	mg/Kg	103.0	06-22-89	SW 7421
MERCURY	0.1	mg/Kg	0.13	06-20-89	SW 7471
NICKEL	2.0	mg/Kg	11.0	06-22-89	SW 6010
SELENIUM	1.0	mg/Kg	ND	06-22-89	SW 7740
VANADIUM	2.0	mg/Kg	23.0	06-22-89	SW 6010

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
SW = EPA METHOD REFERENCES. "SW846"

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

IENT: KERR-McGEE CORPORATION
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: JEFF LUX

REPORT: 2020.77a

DATE: 07-14-89

SAMPLE MATRIX: SOIL
SWLO # 27386
DATE SUBMITTED: 06-15-89
DATE ANALYZED : 06-26-89
METHOD REFERENCE: SW846-8240, EPA METHODOLOGY
PROJECT: REFINING FACILITY; WYNNEWOOD, OKLAHOMA
SAMPLE ID: LM COMPOSITE #1

SKINNER'S LIST

RESULTS REPORTED IN ug/Kg OR Parts Per Billion (PPB)

VOLATILES	DET. LIMIT	RESULTS
BENZENE	5	ND
CARBON DISULFIDE	5	ND
CHLOROBENZENE	5	ND
CHLOROFORM	5	ND
1,2 DICHLOROETHANE	5	ND
1,4 DIOXANE	5	ND
ETHYL BENZENE	5	8
ETHYLENE DIBROMIDE	5	ND
METHYL ETHYL KETONE	5	ND
STYRENE	5	ND
TOLUENE	5	35
XYLENE	5	57

QA/QC SURROGATE RECOVERIES

TOLUENE-d8 (81-117) 115% BROMOFLUOROBENZENE (74-121) 96% 1,2-DICHLOROETHANE (70-121) 103%

ND = NONE DETECTED
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
= SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: KERR-McGEE CORPORATION
ATTN: JEFF LUX

REPORT: 2020.77b
DATE: 07-14-89

SAMPLE MATRIX: SOIL
SWLO # 27386
METHOD REFERENCE: SW846-8270, EPA METHODOLOGY
SAMPLE ID: LM COMPOSITE #1

DATE SUBMITTED: 06-15-89
DATE EXTRACTED: 06-21-89
DATE ANALYZED: 07-14-89

SKINNER'S LIST

RESULTS REPORTED IN ug/Kg OR Parts Per Billion (PPB)

BASE/NEUTRAL EXTRACTABLES	DET. LIMIT	RESULTS	ACID EXTRACTABLE COMPOUNDS	DET. LIMIT	RESULTS
ANTHRACENE	3300	ND	BENZENETHIOL	3300	ND
BENZO(A) ANTHRACENE	3300	ND	CRESOL (ORTHO)	3300	ND
BENZO(B) FLUORANTHENE	3300	ND	CRESOL (PARA)	3300	ND
BENZO(K) FLUORANTHENE	3300	ND	2,4-DIMETHYLPHENOL	3300	ND
BENZO(A) PYRENE	3300	ND	2,4-DINITROPHENOL	16500	ND
BIS(2-ETHYLHEXYL) PHTHALATE	3300	ND	4-NITROPHENOL	16500	ND
BUTYL BENZYL PHTHALATE	3300	ND	PHENOL	3300	ND
CHRYSENE	3300	ND			
DIBENZ(A,H) ACRIDINE	3300	ND			
DIBENZ(A,H) ANTHRACENE	3300	ND			
1,2-DICHLOROBENZENE	3300	ND			
,3-DICHLOROBENZENE	3300	ND			
,4-DICHLOROBENZENE	3300	ND			
DIETHYL PHTHALATE	3300	ND			
7,12-DIMETHYLBENZ(A)ANTHRACENE	3300	ND			
DIMETHYL PHTHALATE	3300	ND			
DI(N)BUTYL PHTHALATE	3300	ND			
DI(N)OCTYL PHTHALATE	3300	ND			
FLUORANTHENE	3300	ND			
INDENE	3300	ND			
METHYL CHRYSENE	3300	ND			
1-METHYL NAPHTHALENE	3300	ND			
NAPHTHALENE	3300	ND			
PHENANTHRENE	3300	5200			
PYRENE	3300	7900			
PYRIDINE	3300	ND			
QUINOLINE	3300	ND			
2-METHYL NAPTHALENE	3300	2800 J			

QA/QC SURROGATE RECOVERIES

NITROBENZENE-d5	(23-120)	58%	2-FLUOROBIPHENYL	(30-115)	110%	TERPHENYL-d14	(18-137)	110%
PHENOL-d5	(24-113)	80%	2-FLUOROPHENOL	(25-121)	83%	2,4,6-TRIBROMOPHENOL	(19-122)	77%

ND = NONE DETECTED
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
= ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
= SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: KERR-McGEE CORPORATION
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: JEFF LUX

REPORT: 2020.78

DATE: 07-14-89

SAMPLE MATRIX: SOIL
SWLO # 27387
DATE SUBMITTED: 06-15-89
PROJECT: REFINING FACILITY; WYNNEWOOD, OKLAHOMA
SAMPLE ID: LM COMPOSITE #2

PARAMETER	DET. LIMIT	UNIT	RESULTS	DATE ANALYZED	METHOD REFERENCE
IGNITABILITY	N/A	°F	>200	06-20-89	SW 1010
EP TOXICITY METALS					
ARSENIC	0.035	mg/L	ND	06-22-89	SW 6010
BARIUM	0.02	mg/L	0.74	06-22-89	SW 6010
CADMIUM	0.005	mg/L	ND	06-22-89	SW 6010
CHROMIUM	0.005	mg/L	ND	06-22-89	SW 6010
LEAD	0.02	mg/L	ND	06-22-89	SW 6010
MERCURY	0.05	mg/L	ND	06-22-89	SW 6010
SELENIUM	0.03	mg/L	ND	06-22-89	SW 6010
SILVER	0.01	mg/L	ND	06-22-89	SW 6010
TOTAL METALS (SKINNER'S LIST)					
ANTIMONY	6.0	mg/Kg	6.0	06-22-89	SW 6010
ARSENIC	2.0	mg/Kg	2.0	06-22-89	SW 7060
BARIUM	4.0	mg/Kg	151.0	06-22-89	SW 6010
BERYLLIUM	1.0	mg/Kg	ND	06-22-89	SW 6010
CADMIUM	1.0	mg/Kg	ND	06-22-89	SW 6010
CHROMIUM	1.0	mg/Kg	31.0	06-22-89	SW 6010
COBALT	2.0	mg/Kg	11.0	06-22-89	SW 6010
LEAD	0.6	mg/Kg	4.92	06-22-89	SW 7421
MERCURY	0.1	mg/Kg	ND	06-20-89	SW 7471
NICKEL	2.0	mg/Kg	11.0	06-22-89	SW 6010
SELENIUM	1.0	mg/Kg	ND	06-22-89	SW 7740
VANADIUM	2.0	mg/Kg	24.0	06-22-89	SW 6010

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
SW = EPA METHOD REFERENCES, "SW846"

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: KERR-McGEE CORPORATION
POST OFFICE BOX 25861
OKLAHOMA CITY, OKLAHOMA 73125
ATTN: JEFF LUX

REPORT: 2020.78a

DATE: 07-14-89

SAMPLE MATRIX: SOIL
SWLO # 27387
DATE SUBMITTED: 06-15-89
DATE ANALYZED : 06-26-89
METHOD REFERENCE: SW846-8240, EPA METHODOLOGY
PROJECT: REFINING FACILITY; WYNNEWOOD, OKLAHOMA
SAMPLE ID: LM COMPOSITE #2

SKINNER'S LIST

RESULTS REPORTED IN ug/Kg OR Parts Per Billion (PPB)

VOLATILES	DET. LIMIT	RESULTS
BENZENE	5	ND
CARBON DISULFIDE	5	ND
CHLOROBENZENE	5	ND
CHLOROFORM	5	ND
1,2 DICHLOROETHANE	5	ND
1,4 DIOXANE	5	ND
ETHYL BENZENE	5	ND
ETHYLENE DIBROMIDE	5	ND
METHYL ETHYL KETONE	5	ND
STYRENE	5	ND
TOLUENE	5	ND
XYLENE	5	ND

QA/QC SURROGATE RECOVERIES

TOLUENE-d8 (81-117) 102% BROMOFLUOROBENZENE (74-121) 95% 1,2-DICHLOROETHANE (70-121) 98%

ND = NONE DETECTED
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: KERR-McGEE CORPORATION
ATTN: JEFF LUX

REPORT: 2020.78b
DATE: 07-14-89

..MPLE MATRIX: SOIL
SWLO # 27387
METHOD REFERENCE: SW846-8270, EPA METHODOLOGY
SAMPLE ID: LM COMPOSITE #2

DATE SUBMITTED: 06-15-89
DATE EXTRACTED: 06-21-89
DATE ANALYZED: 07-14-89

SKINNER'S LIST

RESULTS REPORTED IN ug/Kg OR Parts Per Billion (PPB)

BASE/NEUTRAL EXTRACTABLES	DET. LIMIT	RESULTS	ACID EXTRACTABLE COMPOUNDS	DET. LIMIT	RESULTS
ANTHRACENE	330	ND	BENZENETHIOL	330	ND
BENZO(A) ANTHRACENE	330	ND	CRESOL (ORTHO)	330	ND
BENZO(B) FLUORANTHENE	330	ND	CRESOL (PARA)	330	ND
BENZO(K) FLUORANTHENE	330	ND	2,4-DIMETHYLPHENOL	330	ND
BENZO(A) PYRENE	330	ND	2,4-DINITROPHENOL	1650	ND
BIS(2-ETHYLHEXYL) PHTHALATE	330	ND	4-NITROPHENOL	1650	ND
BUTYL BENZYL PHTHALATE	330	ND	PHENOL	330	ND
CHRYSENE	330	ND			
DIBENZ(A,H) ACRIDINE	330	ND			
DIBENZ(A,H) ANTHRACENE	330	ND			
1,2-DICHLOROBENZENE	330	ND			
' 3-DICHLOROBENZENE	330	ND			
4-DICHLOROBENZENE	330	ND			
DIETHYL PHTHALATE	330	ND			
7,12-DIMETHYLBENZ(A)ANTHRACENE	330	ND			
DIMETHYL PHTHALATE	330	ND			
DI(N)BUTYL PHTHALATE	330	ND			
DI(N)OCTYL PHTHALATE	330	ND			
FLUORANTHENE	330	ND			
INDENE	330	ND			
METHYL CHRYSENE	330	ND			
1-METHYL NAPHTHALENE	330	ND			
NAPHTHALENE	330	ND			
PHENANTHRENE	330	ND			
PYRENE	330	260 J			
PYRIDINE	330	ND			
QUINOLINE	330	ND			
2-METHYL NAPTHALENE	330	ND			

QA/QC SURROGATE RECOVERIES

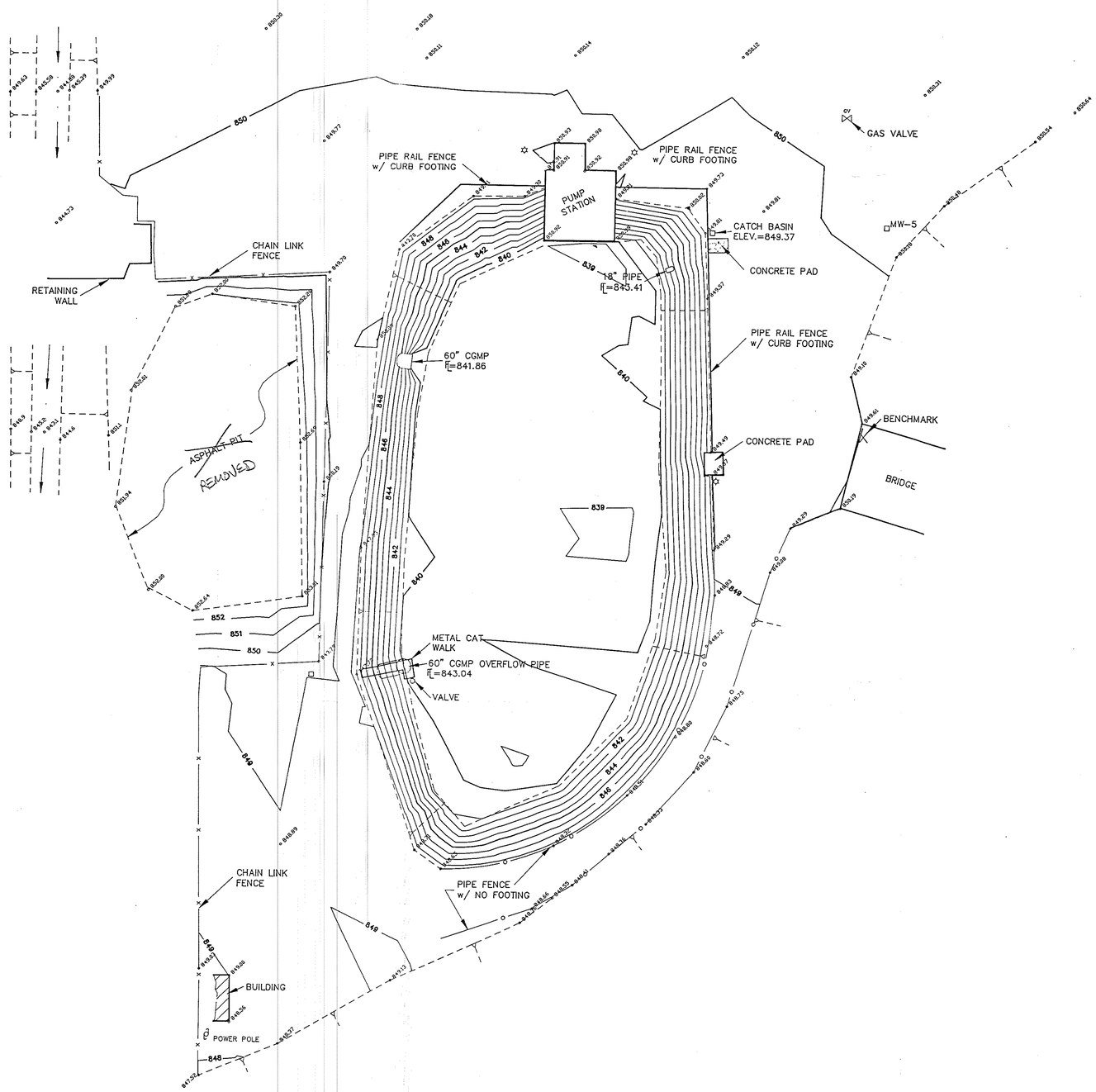
NITROBENZENE-d5	(23-120)	64%	2-FLUOROBIPHENYL	(30-115)	80%	TERPHENYL-d14	(18-137)	86%
PHENOL-d5	(24-113)	89%	2-FLUOROPHENOL	(25-121)	78%	2,4,6-TRIBROMOPHENOL	(19-122)	91%

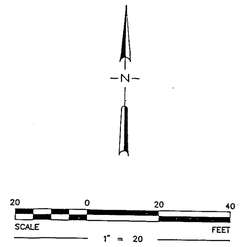
ND = NONE DETECTED
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
= ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
= SURROGATE RECOVERY OUTSIDE OF QC LIMITS

DRAWINGS

DRAWING 1

EXISTING TOPOGRAPHY





LEGEND

- 848 — EXISTING GROUND CONTOUR (1' INTERVAL)
- EXISTING SPOT ELEVATION
- TOP OF EXISTING SLOPE
- TOE OF EXISTING SLOPE

BENCHMARK:
"X" CUT IN CONCRETE AT NORTHWEST CORNER OF BRIDGE.
ASSUMED DATUM ELEVATION = 850.57

Sheet Title: EXISTING TOPOGRAPHY	Client: KERR–McGEE REFINING CORP.	
Document Title: SURFACE IMPOUNDMENT CLOSURE PLAN	Location: WYNNEWOOD, OKLAHOMA	
ROBERTS/SCHORNICK & ASSOCIATES, INC. Environmental Consultants 3700 West Robinson, Suite 200 Norman, Oklahoma 73072 (405) 321-3695	DATE: NOV. 1992	PREPARED BY: WRS
	SCALE: 1" = 20'	CHECKED BY: WRS
		DRAFTED BY: SAR
	PROJECT NO: 9212401 M13	DRAWING No. 1